

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-6. (Canceled)

7. (Currently Amended) A system for distributing streaming media via a data communications medium such as the Internet, said streaming media being composed of a plurality of time-sequenced data elements, comprising:

- (a) a server connected to said data communications medium for transmitting said data elements;
- (b) a server buffer for storing up to a pre-determined number of said data elements for transmission;
- (c) means for supplying said server buffer with said data elements;
- (d) server buffer manager means for deleting the data element that is the oldest from said server buffer for each new data element to be received into said server buffer when said server buffer is full;
- (e) at least one user computer connected to said data communications medium;
- (f) transmission means associated with said server for sending said data elements stored in said server buffer to said user computer via said data communications medium;
- (g) a user buffer associated with said user computer and being provided with means for storing up to a predetermined number of said data elements,

which predetermined number may be different from said predetermined number of data elements to be stored in said server buffer;

- (h) receiving means associated with said user computer for receiving data elements sent from said server via said data communications medium, and for storing said received data elements in said user buffer;
- (i) playing means for playing out audio/video material from said user buffer, said playing out comprising generating audio or video on said user computer from said data elements;
- (j) deleting means for deleting said played out data elements from said user buffer; and

(k) sending means operative:

(1) initially, and whenever when said user buffer is not full, to send data elements ~~from said server buffer to said user computer to fill said user buffer at a rate faster than the rate at which said data elements are played out that is more rapid than the rate at which said data elements are played out by said user computer;~~ and

(2) whenever said user buffer is full, to send data elements ~~from said server buffer to said user computer at about said rate that said data elements are played out by said user computer.~~

~~and wherein said transmission means is configured to receive notification from said user computer of the level of filling of said user buffer and to cause said server to cease sending said data elements while said user buffer is full and thereafter to resume sending said data elements.~~

8. (Previously Presented) A system as recited by claim 7, wherein said means for supplying said server buffer with said data elements is a disk file.

9. (Previously Presented) A system as recited by claim 7, wherein said means for supplying said server buffer with said data elements is a source computer, providing said data elements as they are generated.

10. (Previously Presented) A system, as recited by claim 7, wherein said server sends said data elements to said user computer at a data rate as fast as the data connection between said server and said user computer will support when said user computer buffer is not full.

11. (Previously Presented) A system as recited by claim 7, wherein said user computer is an Internet radio or Internet Appliance.

12. (Previously Presented) A system as recited by claim 7, further comprising control means for said server to prevent sending said data elements to a user computer until said server buffer has stored said pre-determined number of data elements.

13. (Previously Presented) A system as recited by claim 7, further comprising pointer maintaining means for maintaining a record for each user computer of the last data element that had been sent by said server to said user computer,

and for actuating said sending means when said user computer buffer is not full, to enable said sending means to send additional data elements to said user computer at a rate as fast as the connection between said server and said user computer will support, said pointer maintaining means being arranged to maintain said pre-determined number of data elements in said user buffer.

14. (Previously Presented) A system as recited by claim 7, further comprising recording means for maintaining a record for each user computer of the last data element that had been received by said user computer, and, when said user computer buffer is not full, for requesting said sending means to send additional data elements to said user computer, said recording means arranged to maintain said pre-determined number of data elements in said user buffer, and said sending occurring at a rate as fast as the connection between said server and said user computer will support.

15. (Currently Amended) A method for distributing streaming media via a data communications medium such as the Internet from a server, said streaming media being composed of a plurality of time-sequenced data elements, comprising the steps of:

- (a) providing a plurality of time-sequenced data elements;
- (b) loading a predetermined number of said data elements into a server buffer causing it to be full;
- (c) when said server buffer is full with said predetermined number of said data elements, loading said server buffer with said data elements at a rate ap-

proximately equal to the rate at which said data elements are played out when converted to audio or video, and deleting from said server buffer the oldest data element each time a new data element is loaded into said buffer, the loading and deleting arrangement being adapted to maintain the predetermined number of data elements in said buffer;

(d) sending via said data communications medium a group of said data elements sequentially from said server buffer to a user buffer of said user computer as fast as the connection between the server and the user computer will allow to initially fill said user buffer;

(e) loading said sent group of data elements into a user's said user buffer associated with said user computer;

(f) playing said media on said user computer as soon as said data elements first arrive, said played data elements being deleted from said user buffer;

(g) ~~receiving notification in said server from said user computer of the level of filling of said user buffer~~,

(hg) while said user buffer is not full, sending the next sequential data elements from said server to said user computer at a rate as fast as the connection between said server and said user computer will support in such a manner that fills the user buffer to a predetermined number of data elements, and maintains that predetermined number of data elements in the buffer;

(h) while said user buffer is full, sending the next sequential data elements to said user computer at a playback rate at which said data elements are played out when converted to audio or video in a manner that the user buffer is

filled to a predetermined number of data elements, and maintains that pre-determined number of data elements in the buffer; and

(hii) repeating steps "(b)" through "(h)" until all of said data elements of the streaming media are played by said user computer.

16. (previously presented) A method as recited by claim 15, wherein said user computer is an Internet radio or Internet Appliance.

17. (New) A method for distributing streaming media via a data communications medium such as the Internet to at least one user system of at least one user, said streaming media comprising a plurality of sequential media data elements for a digitally encoded audio or video program, the user system being assumed to have a user buffer for receiving media data and facilities to play back said streaming media for viewing or listening by said at least one user as said media data elements arrive at said user system, said method comprising:

sending to said user system said streaming media, to initially fill said user buffer at a rate more rapid than said streaming media is played out by said user system;

detecting if said user buffer is full, during the transmission of said streaming media;

if said user buffer is full, sending the next sequential media data elements to said user buffer at about said rate that said streaming media is played out by said user system; and

if said user buffer is not full, sending the next sequential media data elements to said user system at a rate more rapid than said streaming media is played out by said user system.

18. (New) The method of claim 17, further comprising receiving said media data elements from a source thereof, into a server buffer, wherein said sending of said media data elements to said user system comprises sending media data elements read from said server buffer.

19. (New) The method of claim 18, wherein said source is a disk file and said method further comprises reading said media data elements from said disk file into said server buffer.

20. (New) The method of claim 18, wherein said source is a source computer that provides said data elements as they are generated, and said method further comprises receiving said media data elements from said source computer and loading said media data elements into said server buffer.

21. (New) The method of claim 18, further comprising:

initially placing, in said server buffer, a plurality of said media data elements, said plurality constituting a number of said media data elements sufficient to sustain playback of said streaming media by said user system for the duration of a specified period of delay or interruption in transmission;

placing media data elements in said buffer in place of media data elements read out of said buffer; and

maintaining the number of said media data elements in said buffer at or about said number of media data elements.

22. (New) The method of claim 18, wherein said streaming media is simultaneously provided to a plurality of user systems, further wherein said user systems cannot be assumed to be making identical progress in receiving said streaming media at any given time during transmission, said method further comprising:

maintaining a pointer into said server buffer for each said user, each said pointer indicating the last sequential media data element sent to said user; and

using said pointers to identify which data elements in said server buffer will be sent respectively to each said user as said next sequential data elements.

23. (New) The method of claim 17, wherein said streaming media is simultaneously provided to a plurality of user systems, further wherein said user systems cannot be assumed to be making identical progress in receiving said streaming media at any given time during transmission, and wherein it is assumed that each said user system sends back to said server an identifier identifying the last data element that said user system has received, said method further comprising:

assigning an identifier to each transmitted data element and transmitting said identifier to said user system together with said data element;

for each one of said plurality of users, receiving the identifier of the last data element sent to each said user; and
sending the next sequential data elements to said user.

24. (New) The method of claim 18, further comprising designating as free the space in said server buffer occupied by each said media data element as said media data element is read from said server buffer.

25. (New) The method of claim 21, wherein said server buffer is a FIFO buffer, and wherein said step of initially placing said media data elements into said server buffer further comprises initially loading said media data elements into said server buffer, said step of reading said data elements from said server buffer further comprises reading said data elements, in the order of oldest data elements within said server buffer first.

26. (New) The method of claim 21, wherein said server buffer comprises a portion of a larger buffer, further comprising moving said portion relative to said larger buffer in a time-sequenced manner, and wherein said step of reading said data elements from said server buffer further comprises reading said data elements sequentially from said portion.

27. (New) The method of claim 21, further comprising delaying service of said streaming media in response to a request from said at least one user system for so long as may be necessary for said server buffer to acquire at least said number of said media data elements sufficient to sustain playback of said streaming media for the duration of said specified period of delay or interruption in transmission.

28. (New) The method of claim 17, wherein the user system to which said server is transmitting streaming media is an Internet radio or appliance.

29. (New) The method of claim 17, wherein said step of detecting if said user buffer is full is performed on a server by said at least one transport mechanism installed in said server.

30. (New) The method of claim 29, wherein said at least one transport mechanism is TCP.

31. (New) The method of claim 17, wherein said rate more rapid than said streaming media is played out by said user system is a data rate as fast as said data connection between said server and said user computer will support.

32. (New) A streaming media server providing a buffering system for distributing streaming media via a data communications medium such as the Internet to at least one user system of at least one user, said streaming media comprising a plurality of sequential media data elements for a digitally encoded audio or video program, and said user system being assumed to have a user buffer for receiving media data elements from said server and facilities to play back said streaming media for viewing or listening by said at least one user as said media data elements arrive at said user system, said streaming media server comprising:

memory for storing machine-readable executable routines and for providing a working memory area for routines executing on said server, a central processing unit for executing said machine-readable executable routines, an operating system, at least one communications port connected to said communications medium, and a communications system providing a set of communications protocols for communicating through said at least one port, said set of protocols including a transport protocol; and

a machine-readable executable routine containing instructions to send said media data elements to said at least one user system, through one of said communications ports, via said transport mechanism and said data communications medium, by communications steps comprising:

sending successive ones of said media data elements to initially fill said user buffer at a rate more rapid than said streaming media is played out by said user system;

detecting if said user buffer is full, during the transmission of said media;

if said user buffer is full, sending the next sequential data elements to said user buffer at about said rate that said streaming media is played out by said user system; and

if said user buffer is not full, sending the next sequential data elements to said user system at a rate more rapid than said streaming media is played out by said user system.

33. (New) The streaming media server of claim 32, further comprising a machine-readable executable routine containing instructions to establish a server buffer in said memory, and to receive said media data elements from a source thereof, into said server buffer, wherein said machine readable executable routine that performs the function of sending of said media data elements to said user system further comprises instructions whereby said media data elements that are sent to said user system are read from said server buffer.

34. (New) The streaming media server of claim, 33, wherein said source is a disk file, and said machine-readable executable routine for receiving said media elements from said source comprises instructions for reading said media data elements from said disk file into said server buffer.

35. (New) The streaming media server of claim, 33, wherein said source is a source computer that provides said data elements as they are generated, and said machine-readable executable routine for receiving said media elements from said source comprises instructions for receiving said media data elements from said source computer and loading said media data elements into said server buffer.

36. (New) The streaming media server of claim 33, further comprising a machine-readable, executable routine containing instructions to cause said server to manage said server buffer by buffer management steps comprising:

initially placing, in said server buffer, a plurality of said media data elements, said plurality constituting a number of said media data elements sufficient to sustain playback of said streaming media by said at least one user for the duration of a specified period of delay or interruption in transmission,

placing sequential media data elements in said buffer in place of media data elements read out of said buffer, and

maintaining the number of said media data elements in said buffer at or about said number of data elements

37. (New) The streaming media server of claim 32, wherein said machine-readable executable routine for reading and sending media data elements to said

at least one user system is configured to send data simultaneously to a plurality of user systems, wherein said user systems cannot be assumed to be making identical progress in receiving said streaming media at any given time during transmission, and further comprises:

instructions for maintaining a pointer into said server buffer for each said user, each said pointer indicating the last media data element sent to said user; and

instructions for using said pointers to identify which media data elements in said server buffer will be sent respectively to each said user as said next sequential data elements.

38. (New) The streaming media server of claim 32, wherein said machine-readable executable routine for reading and sending media data elements to said at least one user system is configured to send data simultaneously to a plurality of user systems, wherein said user systems cannot be assumed to be making identical progress in receiving said streaming media at any given time during transmission, and further comprises:

instructions for assigning identifiers to each transmitted data element;

instructions for receiving, for each one of said plurality of users, the identifier of the last data element sent to each said user, through said server's data transport mechanism; and

instructions for sending the next sequential data elements to said user.

39. (New) The streaming media server of claim 33, wherein said server buffer is a FIFO buffer.

40. (New) The streaming media server of claim 33, wherein said server buffer comprises a portion of a larger buffer that is movable with respect to said larger buffer.

41. (New) The streaming media server of claim 32, said steaming media server being adapted to support communications with a user system in the form of an Internet radio or appliance.

42. (New) The streaming media server of 32, wherein said communications system comprises an Internet Protocol suite.

43. (New) The streaming media server of claim 32, wherein said transport mechanism is TCP.

44. (New) The streaming media server of claim 32, wherein said machine-readable executable routine for reading and sending media data elements to said at least one user system is configured to perform said steps of initially filling said user system buffer, and of re-filling said user system buffer when said user system buffer is not full, by sending said media data elements at a data rate as fast as the data connection between said server and said user computer will support.

45. (New) A machine-readable medium on which there has been recorded a computer program for use in operating a server for distributing streaming media comprising a plurality of sequential media data elements via a data communications medium such as the Internet to at least one user system of at least one user, said user system being assumed to have a user buffer for receiving media data and facilities to play back said streaming media for viewing or listening by said at

least one user as said media data elements arrive at said user system, said program recorded on said machine readable medium comprising:

a routine directing said server to send streaming media comprising a plurality of sequential media data elements, to initially fill said user buffer at a rate more rapid than said streaming media is played out by said user system;

instructions to detect if said user buffer is full, during the transmission of said media;

instructions operable if said user buffer is full, to send the next sequential data elements to said user buffer at about said rate that said streaming media is played out by said user system; and

instructions operable if said user buffer is not full, to send the next sequential data elements to said user system at a rate more rapid than said streaming media is played out by said user system.

46. (New) The machine readable medium of claim 45, wherein the computer program recorded on said medium further comprises a routine containing instructions to establish a server buffer in said memory, and to receive said media data elements from a source thereof, into said server buffer, and wherein said routine directing said server to send streaming media to said user system further comprises instructions whereby said media data elements that are sent to said user system are read from said server buffer.

47. (New) The machine readable medium of claim 46, wherein said source is a disk file, and said routine for receiving said media elements from said source

comprises instructions for reading said media data elements from said disk file into said server buffer.

48. (New) The machine readable medium of claim 46, wherein said source is a source computer that provides said data elements as they are generated, and said routine for receiving said media elements from said source comprises instructions for receiving said media data elements from said source computer and loading said media data elements into said server buffer.

49. (New) The machine-readable medium of claim 45, wherein the computer program recorded on said medium further comprises a routine directing said server to manage said server buffer in said server by buffer management steps comprising:

initially placing, in said server buffer, a plurality of said media data elements, said plurality constituting a number of said data media elements sufficient to sustain playback of said streaming media by said user system for the duration of a specified period of delay or interruption in transmission,

placing sequential data elements in said buffer in place of media data elements read out of said buffer, and

maintaining the number of said media data elements in said buffer at or about said first number of media data elements.

50. (New) The machine-readable medium of claim 46, wherein the computer program recorded on said medium is adapted to simultaneously provide said media data elements to a plurality of user systems, and wherein said user systems cannot be assumed to be making identical progress in receiving said

streaming media at any given time during transmission, and further wherein said routine for managing said server buffer further comprises:

instructions for maintaining a pointer into said server buffer for each said user, each said pointer indicating the last sequential media data element sent to said user; and

instructions for using said pointers to identify which data elements in said server buffer will be sent respectively to each said user as said next sequential data elements.

51. (New) The machine-readable medium of claim 45, wherein the computer program recorded on said medium is adapted to simultaneously provide said media data elements to a plurality of user systems, wherein said user systems cannot be assumed to be making identical progress in receiving said streaming media at any given time during transmission, and further wherein said routine for managing said server buffer further comprises:

instructions for assigning identifiers to each transmitted data element;

instructions for receiving, for each one of said plurality of users, the identifier of the last data element sent to each said user, through said server's data transport mechanism; and

instructions for sending the next sequential data elements to said user.

52. (New) The machine-readable medium of claim 49, wherein said routine for managing said server buffer further comprises instructions to designate

as free the space in said server buffer occupied by each said media data element as said media data element is read from said buffer.

53. (New) The machine-readable medium of claim 49, wherein said server buffer is a FIFO buffer, and wherein said routine for managing said server buffer further comprises instructions for initially loading said media data elements into said server buffer, and instructions for reading said media data elements from said server buffer, in the order of oldest data elements within said server buffer first.

54. (New) The machine-readable medium of claim 49, wherein said server buffer is a portion of a larger buffer, and wherein said routine for managing said server buffer further comprises instructions for moving said portion relative to said larger buffer in a time-sequenced manner, and further wherein said instructions for reading said data elements from said server buffer further comprises reading said data elements sequentially from said portion.

55. (New) The machine-readable medium of claim 46, wherein said computer program recorded on said machine-readable medium further comprises instructions to delay service of said streaming media in response to a request from said at least one user system for so long as may be necessary for said server buffer to acquire at least said number of said media data elements sufficient to sustain playback of said streaming media for the duration of said specified period of delay or interruption in transmission.

56. (New) The machine-readable medium of claim 45, wherein said computer program recorded on said machine-readable medium is adapted to support communications with a user system in the form of an Internet radio or appliance.

57. (New) The machine-readable medium of claim 45, wherein said computer program recorded on said machine-readable medium is adapted to use at least one server-provided transport mechanism in performing the operation of detecting if said user buffer is full.

58. (New) The machine-readable medium of claim 57, wherein said at least one transport mechanism is TCP.

59. (New) The machine-readable medium of claim 45, wherein said executable routine for reading and sending data elements to said at least one user system is configured to perform said steps of initially filling said user system buffer, and of re-filling said user system buffer when said user system buffer is not full, by sending said data elements at a data rate as fast as the data connection between said server and said user computer will support.